

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-068148

(43)Date of publication of application : 03.03.2000

(51)Int.Cl.

H01G 4/30

(21)Application number : 10-232459

(71)Applicant : MATSUSHITA ELECTRIC IND CO
LTD

(22)Date of filing : 19.08.1998

(72)Inventor : WATANABE MASAYUKI

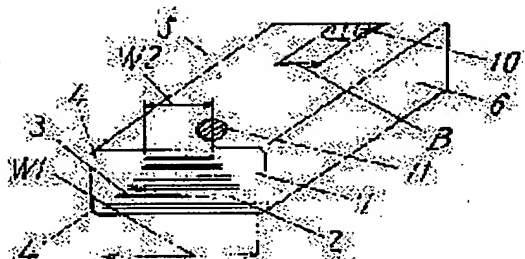
(54) LAMINATING CERAMIC PART AND PART SERIES THEREOF

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent Manhattan phenomenon by orderly reducing width sizes of a drawer for internal electrodes and external electrodes connecting with the internal electrodes from a lower step to an upper step.

SOLUTION: A laminating body 6 is formed by laminating a ceramic layer 1, an internal electrode 2, an invalid layer 4 and so on, clamping by impression and sintering. Width of a drawer part 3 of the internal electrode 2 is reduced from a lower step to an upper step as shown a section 7 of a ceramic part. An indicating mark 11 is formed on the upper surface of the laminating body 6, and an orientation of the laminating ceramic part 5 is identified.

After that, conductive paste is applied on both side surfaces of the laminating body 6, and an external electrode is formed. The external electrode has an extension part to the lower surface and an extension part to the upper surface. A width size of the extension part to the lower surface is formed wider than a width W1 of the drawer part 3 of the most lower internal electrode and a width size of the extension part to the upper surface is formed more narrow than a drawer width W2 of the internal electrode of the most upper surface. By the means Manhattan phenomenon at reflow soldering is prevented.



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[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

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[Patent number]

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[Number of appeal against examiner's decision
of rejection]

[Date of requesting appeal against examiner's
decision of rejection]

[Date of extinction of right]

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(19) 日本国特許庁 (JP)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開 2000-68148

(P 2000-68148A)

(43) 公開日 平成12年3月3日 (2000. 3. 3)

(51) Int. Cl. 7

H01G 4/30

識別記号

301

F I

H01G 4/30

301

テマコード (参考)

A 5E082

審査請求 未請求 請求項の数 3

OL

(全4頁)

(21) 出願番号 特願平10-232459

(22) 出願日 平成10年8月19日 (1998. 8. 19)

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Fターム (参考) 5E082 AA01 AA15 AB03 BC40 EE04

EE16 EE23 EE35 FF05 FG26

FG46 FG54 GG10 GG28 JJ03

JJ23

(54) 【発明の名称】 積層セラミック部品とその積層セラミック部品連

(57) 【要約】

【課題】 本発明はマンハッタン現象を防止する積層セラミック部品を構成することを目的とする。

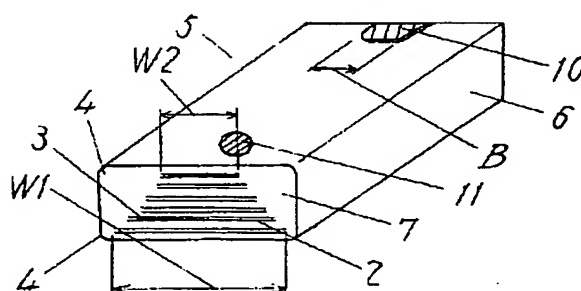
【解決手段】 両側面に外部電極8を形成してなる積層セラミック部品5において、内部電極2の引き出し幅寸法及びそれに接続する外部電極8の幅寸法を下段から上段に向けて順次減少するように形成した。

2 内部電極

3 引き出し部

5 積層セラミック部品

6 積層体



【特許請求の範囲】

【請求項 1】 セラミック層と内部電極を交互に積層し、前記セラミック層を介して内部電極を対向させ、前記複数の内部電極が交互に逆側の端面に延長した引き出し部を有する積層体において、前記内部電極の引き出し部の幅寸法を、前記積層体の下段から上段に向けて順次減少する構成とし、前記積層体の両側面の内部電極の引き出し部に、前記積層体の下段から上段に向け幅寸法を順次減少する外部電極を形成して成る積層セラミック部品。

【請求項 2】 外部電極は積層体の側面から下面と上面に延長部を有し、前記積層体の下面では、最下段の内部電極の引き出し部幅寸法より広い幅寸法に形成し、前記積層体の上面では最上段の内部電極の引き出し部幅寸法より狭い幅寸法に形成し、前記積層体の上面にマーク表示を形成して成る請求項 1 記載の積層セラミック部品。

【請求項 3】 キャリアテープに連続し多数個形成された各凹溝内に請求項 2 の積層セラミック部品を、そのマーク表示面を表面に揃えて収納し、リール姿で包装して成る積層セラミック部品連。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はリフロー半田付け法によりプリント配線板に半田付けをする積層セラミック部品とその積層セラミック部品連に関する。

【0002】

【従来の技術】図 6、図 7 に従来例の積層セラミック部品を示す。図 6 は外観斜視図、図 7 は分解斜視図である。図において 20 は積層セラミック部品で、セラミック層 21 と内部電極 22 とを交互に積層してなる積層体 23 と、前記積層体 23 の両端部において内部電極の引き出し部と接続してなる一対の外部電極 24、25 から構成されている。

【0003】内部電極 22 は一方がセラミック層の内側に形成され、他方向に前記セラミック層の端面まで延長した引き出し部 26 を形成して成り、外部電極 24、25 に接続されている。

【0004】以上の様に構成された積層セラミック部品 20 は図 8 の実装基板モデル図に示すように、リフロー半田付け法を用い、プリント配線板 30 のランド 31 にクリーム半田 32 を塗布し、積層セラミック部品 20 を並べ外部から熱を加えることでクリーム半田 32 を溶かし、その半田が図 8 の様に上部に濡れ上がることで半田付けされる。

【0005】

【発明が解決しようとする課題】しかしながら、前述した従来の積層セラミック部品の構成によると、積層セラミック部品をリフロー半田付け法によりプリント配線板に半田付けをする際、半田が溶け図 8 に示すように、F1、F2 なる力が作用し易く、それぞれのバランスがそ

こなわれると積層セラミック部品 20 が図 9 のように立ち上がり、いわゆるマンハッタン現象が生じることがある。この原因として、一般に図 9 に示す様に、両ランド 31 上の半田 32 の溶融速度に差があり、さらに、溶融した半田 32 のうち積層セラミック部品 20 の側面のモーメント M1 に比べて、下側のモーメント M2 が小さいことにあると考えられる。

【0006】したがって本発明の目的は、マンハッタン現象を防止する積層セラミック部品を提供することである。

【0007】

【課題を解決するための手段】この課題を解決するために本発明は、両側面に外部電極を形成してなる積層セラミック部品において、内部電極の引き出し幅寸法及びそれに接続する外部電極を下段から上段に向けて順次減少するように形成したものである。

【0008】これにより、前記積層セラミック部品は下面をプリント配線板に設置し、立ち上げモーメントの少ない下段部の外部電極の面積が大きくなり、立ち上げモーメントの大きい上段部は外部電極の面積が小さくなり、それに相当して半田が付着するためリフロー半田付けにおけるマンハッタン現象を防止することができる。

【0009】

【発明の実施の形態】本発明の請求項 1 に記載の発明は、セラミック層と内部電極を積層し、前記セラミック層を介して内部電極を対向させ、前記複数の内部電極が交互に逆側の端面に延長した引き出し部を有する積層体において、前記内部電極の引き出し部の幅寸法が前記積層体の下段から上段に向けて順次減少する構成とし、前記積層体の両側面の内部電極の引き出し部に、前記積層体の下段から上段に向け幅寸法を順次減少する外部電極を形成して成る積層セラミック部品であり、リフロー半田付け時に、前記外部電極の上方向に付着する半田量を下方向に押し減少させることで、立ち上げモーメントを抑制し、マンハッタン現象を防止することができる。

【0010】本発明の請求項 2 に記載の発明は、外部電極を、積層体の側面から下面と上面に延長部を形成し、前記積層体の下面では、最下段の内部電極の引き出し部幅寸法より広い幅寸法に形成し、前記積層体の上面では最上段の内部電極の引き出し部幅寸法より狭い幅寸法に形成し、前記積層体の上面にマーク表示を形成して成る請求項 1 記載の積層セラミック部品であり、プリント配線板への設置面となる前記積層体の下面で幅広の延長部により半田付け面積を大きく形成し、前記積層体の上面に幅の狭い延長部を形成して半田付け面積を小さくすることで、溶融した半田のプリント配線板との設置面での張力を大きくし、前記の立ち上げモーメントを抑制し、マンハッタン現象を尚一層防止する効果を有する。また、前記積層体の上面に形成したマーク表示により、プリント配線板への設置面の判別が容易となる。

【0011】本発明の請求項3に記載の発明は、キャリアテープに連続し多数個形成された凹溝に前記積層体のマーク表示を表面に揃えて収納し、リール姿で包装して成る積層セラミック部品連の構成であり、プリント配線板に前記セラミック部品が実装される際に設置部となる前記積層体の下面が揃って下方向に整列しているため作業性が良好で実装ミスを低減できる。

【0012】以下、本発明の実施の形態について図1から図5を用いて説明する。

（実施の形態1）図1は本発明の一実施の形態の分解斜視図を示し、図において、1はセラミック層であり、内部電極2と交互に積層する。前記内部電極2は幅寸法Wを下段から上段に向け減少し形成して成る端面への引き出し部3を有している。また内部電極2を持たない無効層4を上段と下段に構成して成る。

【0013】図2は同実施の形態の積層完成姿を示し、積層セラミック部品5片面7を断面で示す。6は積層体であり、前記セラミック層1、内部電極2、無効層4等を積み重ね、加圧圧着、焼成を経て成る。前記セラミック部品の断面7には内部電極の引き出し部3が図示されており図のように下段から上段に向けてその幅寸法が減少したものとなっている。11は前記積層体6の上面に形成した表示マークであり、積層セラミック部品5の方向性の識別になる。

【0014】図3は同実施の形態を下方より見た斜視図である。積層体6の両側面に導電ペーストを塗布し、外部電極8を形成している。前記外部電極8は下面への延長部9と図2に示す上面への延長部10を有し、下面への延長部9は幅寸法Aを最下段の内部電極の引き出し幅W1より広く形成し、上面への延長部10は幅寸法Bを最上段の内部電極の引き出し幅W2より狭く形成している。前記下面への延長部9の延長長さLは外部電極の高さ寸法Hより大きい方がマンハッタン現象の防止に有効である。

【0015】図4は前記積層セラミック部品5をキャリアテープに収納した平面図、図5はその断面図を示す。

【0016】図において12はキャリアテープであり、凹溝13をテープの長手方向に連続し多数個を形成して成る。前記凹溝13には積層セラミック部品5を収納し、前記キャリアテープの両面に保持テープ14を貼り付け保持している。11は前記積層セラミック部品5の

積層体上面に形成した表示マークであり前記キャリアテープの表面に揃え保持テープ14に重ならない位置にあり、リール姿（図示せず）にし包装する。

【0017】

【発明の効果】以上のように本発明によれば、内部電極層の引き出し部と外部電極を、下段から上段に向け減少し形成した積層セラミック部品を構成することでリフロー半田付けにおけるマンハッタン現象を防止できる。

【0018】また、前記積層セラミック部品の上面にマーク表示を形成することでプリント配線板への実装の際に設置面の識別が容易となる。

【0019】更に、包装形態においてキャリアテープに形成した凹溝に前記積層セラミック部品を前記マーク表示を表面に揃えリール巻きすることで、プリント配線板への実装の際、積層セラミック部品の下面をプリント配線板への設置面とし方向を揃え実装することが容易で、作業性に優れたものとなる。

【図面の簡単な説明】

【図1】本発明の一実施の形態の分解斜視図

【図2】同一方側を切断した斜視図

【図3】同外観斜視図

【図4】同包装姿を示す平面図

【図5】同包装姿の断面図

【図6】従来例の斜視図

【図7】従来例の分解斜視図

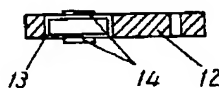
【図8】マンハッタン現象を説明する実装モデル図

【図9】マンハッタン現象を説明する実装モデル図

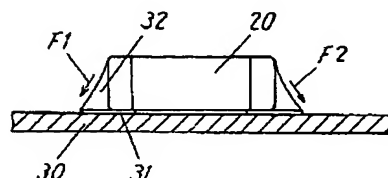
【符号の説明】

- 1 セラミック層
- 2 内部電極
- 3 引き出し部
- 4 無効層
- 5 積層セラミック部品
- 6 積層体
- 8 外部電極
- 9 下面への延長部
- 10 上面への延長部
- 11 表示マーク
- 12 キャリアテープ
- 13 凹溝
- 14 保持テープ

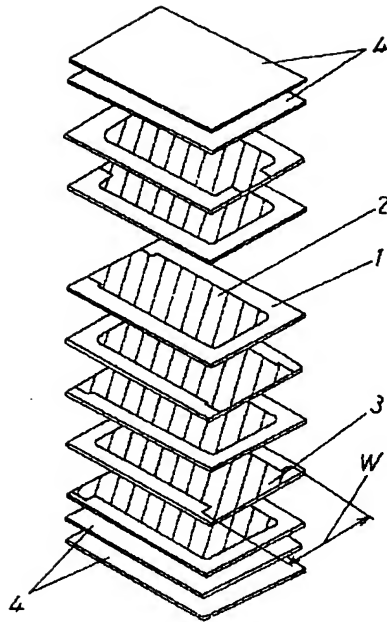
【図5】



【図8】

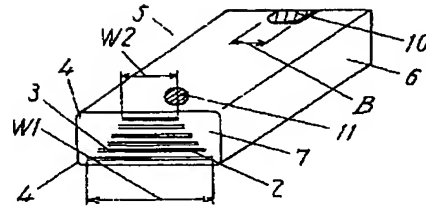


【図1】

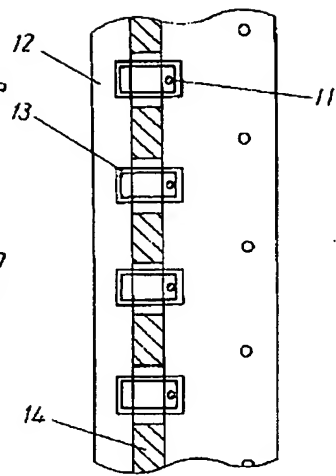


【図2】

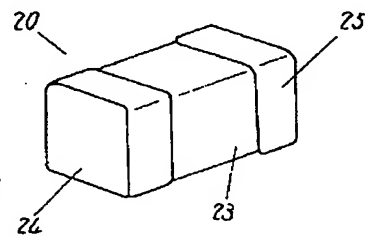
- 2 内部電極
3 引き出し部
5 積層セラミック部品
6 積層体



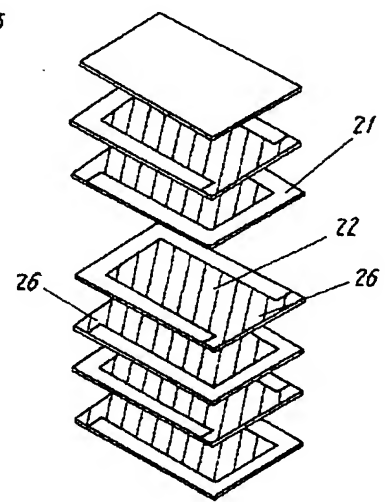
【図4】



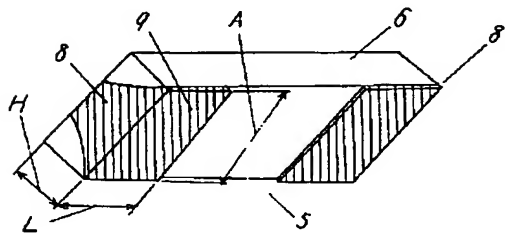
【図6】



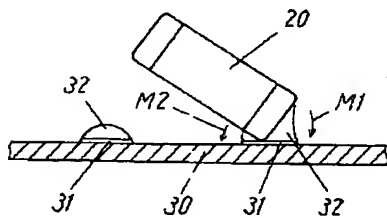
【図7】



【図3】



【図9】



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PROBLEM TO BE SOLVED: To prevent Manhattan phenomenon by orderly reducing width sizes of a drawer for internal electrodes and external electrodes connecting with the internal electrodes from a lower step to an upper step.

SOLUTION: A laminating body 6 is formed by laminating a ceramic layer 1, an internal electrode 2, an invalid layer 4 and so on, clamping by impression and sintering. Width of a drawer part 3 of the internal electrode 2 is reduced from a lower step to an upper step as shown a section 7 of a ceramic part. An indicating mark 11 is formed on the upper surface of the laminating body 6, and an orientation of the laminating ceramic part 5 is identified. After that, conductive paste is applied on both side surfaces of the laminating body 6, and an external electrode is formed. The external electrode has an extension part to the lower surface and an extension part to the upper surface. A width size of the extension part to the lower surface is formed wider than a width W1 of the drawer part 3 of

the most lower internal electrode and a width size of the extension part to the upper surface is formed more narrow than a drawer width W2 of the internal electrode of the most upper surface. By the means Manhattan phenomenon at reflow soldering is prevented.

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CLAIMS

[Claim(s)]

[Claim 1] In the layered product which carried out the laminating of the internal electrode to the ceramic layer by turns, the internal electrode was made to counter through said ceramic layer, and said two or more internal electrodes extended to the end face by the side of reverse by turns and which pulls out and has the section The laminating ceramic components which form the external electrode which considers the width method of the drawer section of said internal electrode as the configuration which turns to an upper case and carries out sequential reduction from the lower berth of said layered product, and carries out sequential reduction of the width method towards an upper case at the drawer section of the internal electrode of the both-sides side of said layered product from the lower berth of said layered product, and change.

[Claim 2] An external electrode is a laminating ceramic component according to claim 1 which has an extension on an inferior surface of tongue and the top face from the side face of a layered product, forms in a large width method, form in a width method narrower than the drawer section width method of the internal electrode of the maximum upper case, forms a mark display in the top face of said layered product on the top face of said layered product, and consists of the drawer section width method of the internal electrode of the bottom on the inferior surface of tongue of said layered product.

[Claim 3] The laminating ceramic components ream which arranges the mark screen with a front face, contains it, packs the laminating ceramic components of claim 2 in a reel figure, and changes in each concave formed succeeding the carrier tape. [many]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the laminating ceramic component which solders to a printed wired board by the reflow soldering method, and its laminating ceramic components ream.

[0002]

[Description of the Prior Art] The laminating ceramic components of the conventional example are shown in drawing 6 and drawing 7 . Drawing 6 is an appearance perspective view and drawing 7 is a decomposition perspective view. In drawing, 20 is laminating ceramic components and consists of external electrodes 24 and 25 of a pair which come to connect the ceramic layer 21 and an internal electrode 22 with the drawer section of an internal electrode in the both ends of the layered product 23 which comes to carry out a laminating by turns, and said layered product 23.

[0003] It is formed inside a ceramic layer, and one side forms the drawer section 26 extended to the end face of said ceramic layer in the other directions, and grows into them, and the internal electrode 22 is connected to the external

electrodes 24 and 25.

[0004] As the laminating ceramic components 20 constituted as mentioned above are shown in the mounting substrate model Fig. of drawing 8 , using the reflow soldering method, the cream solder 32 is applied to the land 31 of a printed wired board 30, and the cream solder 32 is melted by putting the laminating ceramic components 20 in order and applying heat from the exterior, and when the solder has been damp in the upper part like drawing 8 , it is soldered.

[0005]

[Problem(s) to be Solved by the Invention] However, in case it solders to a printed wired board by the reflow soldering method, as according to the configuration of the conventional laminating ceramic components mentioned above solder melts and laminating ceramic components are shown in drawing 8 , when F1 and the force it is weak F2 tend to act and each balance is spoiled, the laminating ceramic components 20 may start like drawing 9 , and the so-called Manhattan phenomenon may arise. As this cause, as generally shown in drawing 9 , a difference is in the melting rate of the solder 32 on both the lands 31, and it is further thought compared with the moment M1 of the side face of the laminating ceramic components 20 among the fused solder 32 that it is in the lower moment M2 being small.

[0006] Therefore, the purpose of this invention is offering the laminating ceramic components which prevent the Manhattan phenomenon.

[0007]

[Means for Solving the Problem] In order to solve this technical problem, this invention is formed in the laminating ceramic components which come to form an external electrode in a both-sides side so that the external electrode linked to the drawer width method of an internal electrode and it may be turned to an upper case from the lower berth and sequential reduction may be carried out.

[0008] Thereby, said laminating ceramic component installs an inferior surface of tongue in a printed wired board, the area of the external electrode of the lower-

berth section with little starting moment becomes large, and the area of an external electrode becomes small, and since it is equivalent to it and solder adheres, the upper case section with the large starting moment can prevent the Manhattan phenomenon in reflow soldering.

[0009]

[Embodiment of the Invention] In the layered product which invention of this invention according to claim 1 carried out the laminating of the internal electrode to the ceramic layer, the internal electrode was made to counter through said ceramic layer, and said two or more internal electrodes extended to the end face by the side of reverse by turns and which pulls out and has the section It considers as the configuration in which the width method of the drawer section of said internal electrode carries out sequential reduction towards an upper case from the lower berth of said layered product. They are the laminating ceramic components which form in the drawer section of the internal electrode of the both-sides side of said layered product the external electrode which carries out sequential reduction of the width method towards an upper case, and change from the lower berth of said layered product to it. By decreasing the amount of solder adhering to above [of said external electrode] to down at the time of reflow soldering, the starting moment can be controlled and the Manhattan phenomenon can be prevented.

[0010] Invention of this invention according to claim 2 forms an extension in an inferior surface of tongue and a top face for an external electrode from the side face of a layered product. On the inferior surface of tongue of said layered product Form in a width method larger than the drawer section width method of the internal electrode of the bottom, and it forms in the width method narrower than the drawer section width method of the internal electrode of the maximum upper case on the top face of said layered product. It is the laminating ceramic component according to claim 1 which form a mark display in the top face of said layered product, and grows into it. By forming soldering area greatly by the broad extension on the inferior surface of tongue of said layered product used as the

installation side to a printed wired board, forming an extension with narrow width of face in the top face of said layered product, and making soldering area small. Tension in respect of installation with the printed wired board of the fused solder is enlarged, the aforementioned starting moment is controlled, and it has the effectiveness of preventing the Manhattan phenomenon still further. Moreover, distinction of the installation side to a printed wired board becomes easy by the mark display formed in the top face of said layered product.

[0011] Invention of this invention according to claim 3 arranges and contains the mark display of said layered product on a front face to the concave which followed the carrier tape and were formed, and it is the configuration of the laminating ceramic components reel which packs and changes in a reel figure, and since the inferior surfaces of tongue of said layered product used as the installation section have aligned downward together in case said ceramic component is mounted in a printed wired board, its workability is good and it can reduce a mounting mistake.

[0012] Hereafter, the gestalt of operation of this invention is explained using drawing 5 from drawing 1 .

(Gestalt 1 of operation) Drawing 1 shows the decomposition perspective view of the gestalt of 1 operation of this invention, and in drawing, 1 is a ceramic layer and carries out a laminating to an internal electrode 2 by turns. Said internal electrode 2 has the drawer section 3 to the end face which turns the width method W to an upper case from the lower berth, decreases and forms, and changes. Moreover, the invalid layer 4 without an internal electrode 2 is constituted in an upper case and the lower berth, and it changes.

[0013] Drawing 2 shows the laminating completion figure of the gestalt of this operation, and shows laminating ceramic components 5 one side 7 in a cross section. 6 is a layered product, accumulates said ceramic layer 1, an internal electrode 2, and invalid layer 4 grade, and changes through pressurization sticking by pressure and baking. It is that to which the drawer section 3 of an internal electrode is illustrated in the cross section 7 of said ceramic component,

and the width method decreased towards the upper case from the lower berth as shown in drawing. 11 is the distinguishing mark formed in the top face of said layered product 6, and becomes discernment of the directivity of the laminating ceramic components 5.

[0014] Drawing 3 is the perspective view which looked at the gestalt of this operation from down. Conductive paste is applied to the both-sides side of a layered product 6, and the external electrode 8 is formed. Said external electrode 8 has the extension 10 to the top face shown in the extension 9 and drawing 2 to an inferior surface of tongue, the extension 9 to an inferior surface of tongue forms the width method A more widely than the drawer width of face W1 of the internal electrode of the bottom, and the extension 10 to a top face forms the width method B more narrowly than the drawer width of face W2 of the internal electrode of the maximum upper case. The larger one of extended die-length L of the extension 9 to said inferior surface of tongue than the height dimension H of an external electrode is effective in prevention of the Manhattan phenomenon.

[0015] The top view where drawing 4 contained said laminating ceramic component 5 on the carrier tape, and drawing 5 show the sectional view.

[0016] In drawing, 12 is a carrier tape, follows the longitudinal direction of a tape in a concave 13, and comes to form many. The laminating ceramic components 5 are contained to said concave 13, and the maintenance tape 14 is stuck and held to both sides of said carrier tape. 11 is in the location which is the distinguishing mark formed in the layered product top face of said laminating ceramic component 5, keeps step with the front face of said carrier tape, and does not lap with the maintenance tape 14, is made into a reel figure (not shown) and is packed.

[0017]

[Effect of the Invention] According to this invention, the Manhattan phenomenon in reflow soldering can be prevented as mentioned above with constituting the laminating ceramic components which turned the drawer section and the external electrode of an internal electrode layer to the upper case, and decreased in

number and formed them in it from the lower berth.

[0018] Moreover, discernment of an installation side becomes easy in the case of mounting to a printed wired board by forming a mark display in the top face of said laminating ceramic component.

[0019] Furthermore, by arranging said laminating ceramic component with the concave formed in the carrier tape in the package gestalt, arranging said mark display with a front face, and carrying out a reel volume, in the case of mounting to a printed wired board, the inferior surface of tongue of laminating ceramic components is made into the installation side to a printed wired board, it is easy to arrange and mount a direction and it becomes the thing excellent in workability.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The decomposition perspective view of the gestalt of 1 operation of this invention

[Drawing 2] The perspective view which cut the method side of the same

[Drawing 3] This appearance perspective view

[Drawing 4] The top view showing this package figure

[Drawing 5] The sectional view of this package figure

[Drawing 6] The perspective view of the conventional example

[Drawing 7] The decomposition perspective view of the conventional example

[Drawing 8] The mounting model Fig. explaining the Manhattan phenomenon

[Drawing 9] The mounting model Fig. explaining the Manhattan phenomenon

[Description of Notations]

1 Ceramic Layer

2 Internal Electrode

3 Drawer Section

4 Invalid Layer

5 Laminating Ceramic Components

6 Layered Product

8 External Electrode

9 Extension to Inferior Surface of Tongue

10 Extension to Top Face

11 Distinguishing Mark

12 Carrier Tape

13 Concave

14 Maintenance Tape

[Translation done.]

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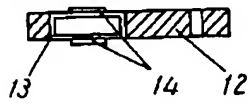
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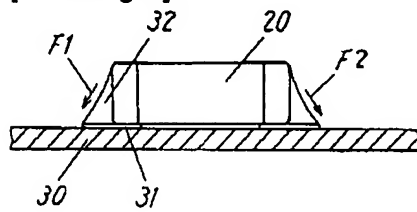
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DRAWINGS

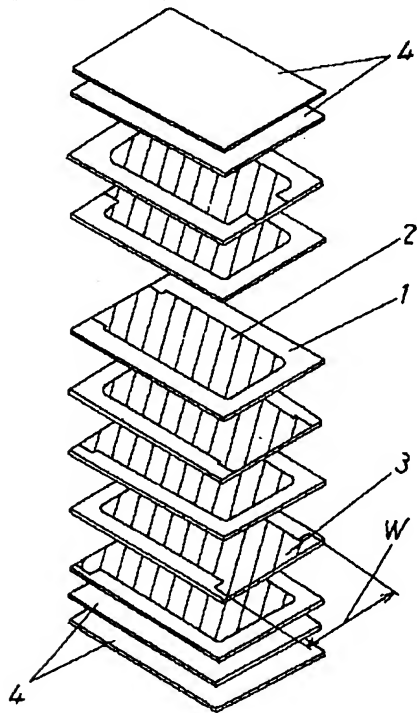
[Drawing 5]



[Drawing 8]

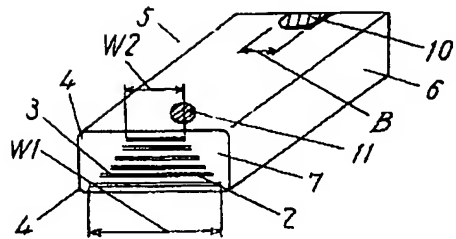


[Drawing 1]

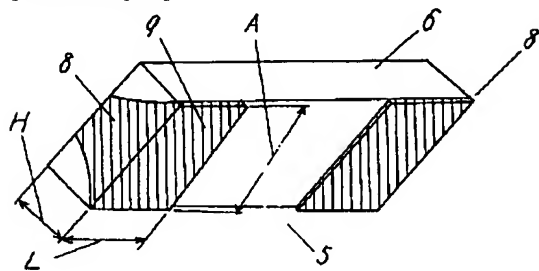


[Drawing 2]

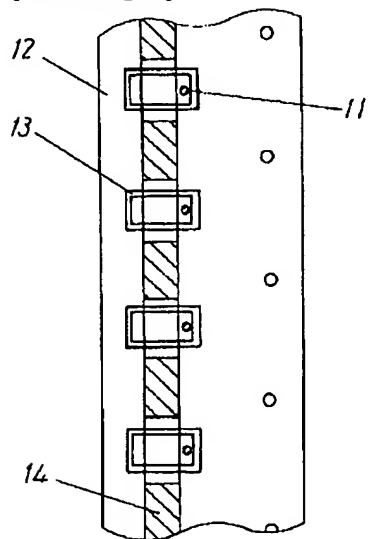
- 2 内部電極
- 3 引き出し部
- 5 積層セラミック部品
- 6 積層体



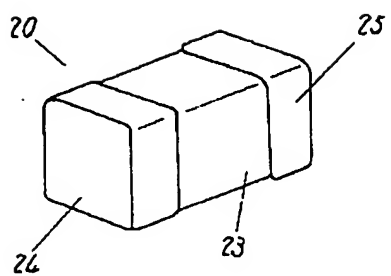
[Drawing 3]



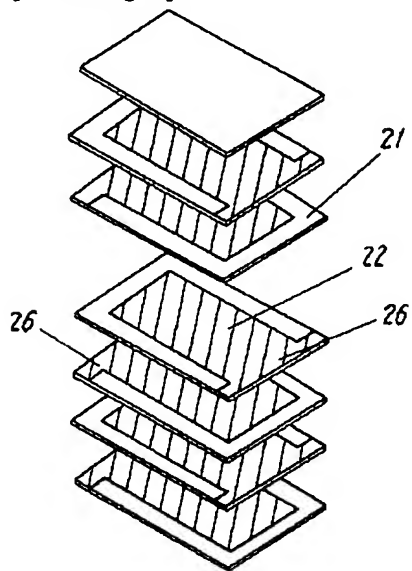
[Drawing 4]



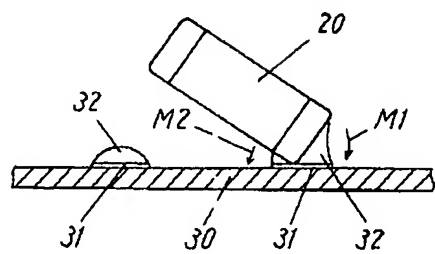
[Drawing 6]



[Drawing 7]



[Drawing 9]



[Translation done.]